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A CASE OF PARALYSIS OF THE TRIGEMINUS
FOLLOWED BY ALTERNATE HEMIPLEGIA—
ITS RELATIONS TO THE NERVE OF TASTE.

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Mr. H., single, *æt.* thirty-six, Canada, was born of healthy parents, and had never suffered from any disease except a very severe and chronic eczema of the scalp. He has drank and smoked moderately, has played racket and tennis a great deal, being, I believe, one of the champion racket-players of Montreal.

He denies absolutely ever having had syphilis, and gives no history of it.

Last August (1885) he noticed a feeling of numbness upon the left side of the face. The onset of this was not accompanied with any marked symptoms, and he did not consult a physician.

His eczema becoming worse, he came, on Nov. 29, 1885, to Dr. George L. Fox for treatment.

On Nov. 30th he had been a little dizzy, but went to bed feeling well. Next morning he awoke paralyzed on the right side in arm and leg, and in left side of face.

The loss of motion was greatest in arm, but was not complete. The facial paralysis was slight but unmistakable, and the tongue protruded to the left (affected) side. There was also anæsthesia complete in the left side of the face and left half of the mouth and tongue as far back as the pillars of the fauces. The uvula hung straight. The muscles of mastication were also slightly involved, judging from the fact that the patient could not chew on the left side because "the jaws felt too weak" for the effort. He had always chewed on that side before. There was a perceptible atrophy of the masseter on the left side. Some ataxic aphasia

was present for a few days. There was some paræsthesia on the right side, but no anæsthesia at all.

The temperature on the two sides the same evening was equal and normal. The patient grew a little worse during the first twenty-four hours, then began steadily to grow better, except as regards the paralysis of the fifth nerve.

The tongue was tested carefully and repeatedly for loss of taste, but the patient could distinguish bitters, acids, salts, and sweets equally well on each side both in front and at the back. He simply complained of a feeling of numbness on the left side of the mouth.

The sense of smell was not affected, and the nasal branches of the fifth responded to ammonia as well in the left nostril as in the right.

There was no disturbance of hearing.

On Dec. 27th, three and a half weeks after the seizure, I examined him again.

He could walk very well, and move his arm and use his hand. Grip of right hand, 28; left, 48. No sensory disturbance on right side, and no contractures.

The left facial paralysis had almost entirely disappeared, but the left half of the forehead looked a little smoother, and the tongue protruded a little to the left.

Anæsthesia was almost complete over the whole of the left side of the face, from the chin to a line running vertically from the auditory meatus, and as far back as the tragus. The lower part of the chin and cheek were a little more sensitive, owing to the psoriasis and application of irritative medicaments, which had caused some inflammatory congestion.

Tactile, temperature, and pathic sense were all abolished. The patient could just feel the hard pressure of blunt or sharp points, but could not count or locate them. The cornea was insensible also. So were the left half of the tongue as far back as its root, and the gums and palate as far back as and including the anterior pillars.

There was no apparent disturbance of the mucous or salivary secretion. The left eye showed slight myosis and myopia, and vision was less distinct. The pupillary reflexes to light and accommodation were normal. There were no trophic disturbances.

On Jan. 1st the patient was again attacked with a hemiplegia, affecting mainly the left arm. The paralysis came on slowly without much mental disturbance. The face was slightly affected. There was no change in the anæsthesia.

It is quite impossible as yet to say positively by what paths sensations of taste reach the brain. It has been generally taught that the glosso-pharyngeal is the nerve of taste for the posterior third of the tongue and the trigeminal for the anterior two thirds.

Dr. Gowers has, however (*Four. of Physiology*, vol. iii., p, 384), published a report of a case of total trigeminal paralysis, with total loss of sense of taste over the whole of the tongue on the affected side. He affirms, in his work on "Diagnosis of Brain Diseases," that all taste-sensations reach the brain through the fifth cranial nerve, and that the idea that the glosso-pharyngeal is a nerve of taste is a curious physiological myth. Vintschgau (Hermann's "Handb. der Phys.") states just as positively, after reviewing the question, that no physiologist at the present day doubts that the glosso-pharyngeal supplies taste to the back part of the tongue. Landois, Duval, Lussana, Vulpian, and many of the earlier physiologists, assign to the glosso-pharyngeal or the intermediary nerve of Wrisberg, all taste-functions.

So far as opinions go, therefore, we really do not seem to have any definite nerve of taste. It appears to me to be something of a reproach that a special sense peculiarly mammalian, and still more peculiarly the characteristic of civilized man, should be without a known conducting organ; and that the afferent impulses excited by the modern dinner should pass up to the brain through uncertain and unknown channels.

My own case has naturally led me to doubt the dogmatic assertion of Gowers; and its teachings, so far as they go, are in harmony with the view which I have of late held, that from the glosso-pharyngeal nucleus come all the fibres that conduct taste-sensations to the brain. Although I am quite aware that there are some serious objections to this view, yet it has so much *a priori* probability that I am constrained to use my case as the basis of a plea for the glosso-pharyngeal nerve.

The evidence that the glosso-pharyngeal is, in part at least, a nerve of taste is almost overwhelming.

1. By anatomical dissections the fibres of this nerve have been traced directly to the taste-organs (Vintschgau).
2. By the Wallerian and atrophy methods, Vintschgau and Honigschmied have found that after resecting the glosso-pharyngeal nerves in young rabbits the peripheral portions and the taste-buds atrophy and disappear (Hermann's "Handb. der Phys.").

3. The physiological experiments of Magendie, Panizza, J. Reid, Broughton, Valentin, Wagner, Stannius, Lussana, and others, show that after resecting the glosso-pharyngeals the sense of taste is partly or wholly destroyed.

4. The clinical evidence that the glosso-pharyngeal has something to do with the function of taste is almost unanimous. In all cases of trigeminal paralysis reported, so far as I can find, there is either no loss of taste or loss of taste only on the anterior two thirds of the tongue, Gowers' cases being the only exceptions to this rule.

The single case which he has reported in full (*vide loc. cit.*) was that of a patient who also had paralysis of the third and sixth cranial nerves, and as there was no post mortem it would be quite impossible to exclude the glosso-pharyngeal absolutely, and more especially any connecting filaments carrying taste-fibres to the fifth, as Carl, Prevost, and Vintschgau suggest.

But, furthermore, Gowers can certainly not be aware of the positive evidence in favor of a gustatory function for the glosso-pharyngeal.

Thus K. B. Lehmann reports a case of one-sided traumatic paralysis of the glosso-pharyngeal. The tongue on the affected side was entirely insensible to the taste of sugar or quinine on the border, middle, and posteriorly in the region of the circumvallate papillæ. On the other hand acids, salts, and astringents caused certain taste-sensations, though apparently perverted. There was no loss of general sensibility (*Arch. f. gesammt. Phys.*, xxxiii., p. 194).

Again, Grasset has observed loss of taste in two cases of glosso-labio-laryngeal paralysis ("Mal. des Syst. Nerv.").

Another case of isolated paralysis of the glosso-pharyngeal is reported by M. Gendrin, in a translation of Dr. Abercrombie's work, on "Diseases of the Nervous System," p. 627. Here the nerve, on one side, was atrophied by pressure of cyst. There was loss of taste on the affected side over the whole surface. The case is reported with great explicitness.

I have now under treatment a patient suffering from bulbar paralysis, some of whose taste-sensations are per-

verted. A solution of quinine applied to his tongue he repeatedly assured me tasted sweet. If, to all the positive evidence thus referred to, we add the negative evidence, that trigeminal paralysis, no matter how complete, does not, with a very few exceptions, cause loss of taste at the back of the tongue, it appears to me that Gowers' rather flippant disposal of the glosso-pharyngeal as a nerve of taste has very little foundation.

Assuming, therefore, what has heretofore been almost uniformly admitted, that the glosso-pharyngeal nerve certainly carries the taste-sensations from the posterior surface of the tongue, the real problem remains to determine what nerve supplies the remainder of this organ.

No one now denies that the *chorda tympani* of the *facial*, almost always, if not uniformly, carries taste-fibres to the *lingualis* branch of the *fifth*, and through it supplies the anterior two thirds of the tongue.

But there are at least three views as to the origin of the taste-fibres of the *chorda*.

1st. The one usually accepted—viz.: that these fibres, running up the *chorda*, pass to the *geniculate ganglion*, then, via the large *superior petrosal nerve*, to *Meckel's ganglion*, and so via the second branch of the *fifth nerve* to the brain. This is the view first placed on a firm basis by the experiments of *Schiff* (1867-73).

It is supported by experiments upon animals and by cases of trigeminal paralysis with loss of taste in the anterior portion of the tongue, reported by *Romberg*, *Von Meyer*, *Rigler*, *Austin*, *Hirschberg*, *Kocher*, *Guttmann*, *Erb*, *Senator*, *Gowers*, and *Seeligmann*. The evidence thus furnished was sufficient to convince *Erb* that, "in most cases," this was their source; but he appears to think that there may be individuals in whom the paths of taste-sensations take other courses; and he tells us that a specially differentiated nerve, with definite peripheral end-organs, has no definite path to the brain. This is certainly not in accordance with analogies; nor should we expect nature to be so careless or indifferent in informing man of the sapidity of his environment. A special sense, which is as old as the

mollusks, should apparently have its *own* nerve-paths, and not be ministered to by a nerve like the fifth, already having the two functions of general and tactile sensibility.

Besides, there has now accumulated a great deal of evidence against the view that the trigeminus has any taste-fibres.

The physiological experiments of Panizza, Valentin, J. Reid, Prevost, Lussana, and Duchenne all point against this view. The cases of trigeminal paralysis without loss of taste now reported are so numerous and authenticated that they cannot be disposed of in the way that Erb did when he analyzed them ten years ago. Dr. Hislop, for example, had a case in which the trigeminal root and the sphenopalatin ganglion were destroyed without loss of taste. (Wilkes' "Diseases of Nervous System.") The cases of Vulpian (cited later) and my own must be added to those first criticised by Erb—viz., of Romberg, Stamm, Berard, Renzi, Viccioli, Nixon, and Althaus.

In *Brain*, Jan., 1886, Dr. Thos. Harris reports a case in which a tumor involved the right side of the pons, entirely destroying the fifth nerve and Gasserian ganglion on that side, and causing total hemianesthesia of the face and tongue, without loss of taste.

Vulpian (*Compt. Rend.* No. 21, 1885) has recently stated his opinion, based on experiment and a clinical case, that the nerve of Wristsberg sends gustatory and vaso-dilator fibres to the anterior part of the tongue, through the facial and chorda t., and similar fibres to the soft palate, via the great superficial petrosal and Meckel's ganglion. The intermediary nerve of Wristsberg is, he thinks, the sensory root of the fifth.

He reports a case somewhat like mine. A man suffered with hemiparesis and hemianesthesia of the left side of the trunk and extremities, but only left hemianesthesia of the face. There was a *right* facial paralysis and partial loss of sense of taste on the *right* side of the tongue over its anterior two thirds, and on the right side of the soft palate. There was diminution of tactile sensibility on the left side of the tongue, but no loss of taste.

Recently this patient died, and Vulpian (*Prog. Méd.*, Jan,

9, 1886) found a small tumor of the size of a hazel-nut in the upper part of the right half of the medulla.

Dr. C. A. Carl (*Arch. f. Ohrenheilk.*, x., p. 152) describes a personal experience. He has absolutely no sense of taste in the left anterior half of his tongue. All his cranial nerves are normal, but he has had a chronic otorrhœa in the left ear, which has destroyed the drum. Carl thinks from direct experiments upon it that his chorda is not injured or paralyzed, and that the affected taste-fibres come from the glosso-pharyngeal leaving the ganglion petrosum, through Jacobson's nerve, tympanic plexus, thence in greatest part through the N. super-petros. minor to the otic ganglion, and so to the lingualis branch of the fifth; others, and in his case the smallest part, passing from the tympanic plexus to the geniculate ganglion, and thence to the facial, the chorda, and so to the lingualis.

The view that the taste-fibres of the chorda come from the intermediary nerve of Wrisberg has had some supporters, and Vulpian's case, above cited, is in its favor.

Spitzka (*Med. Record*, Jan. 31, 1880) claims that the fibres of origin of the nervus intermedius of Wrisberg do not originate in the facial nucleus, but in a "diffuse" nucleus lying below the altitude of the facial nucleus and in an ideal continuation of the gelatinous column of the trigeminal region; or, in other words, in the sensory gray column of the medulla.

Horatio R. Bigelow (*Med. Record*, Jan. 17, 1880) states, as the result of numerous dissections, that the chorda tympani is a distinct nerve from the facial, and is continuous anatomically with the nervus intermedius of Wrisberg.

Prof. M. Duval claims to have traced the N. intermedius to a continuation of the glosso-pharyngeal nucleus, of which he considers it an erratic branch.

The view that the nerve of Wrisberg is a sensory branch of the facial, carrying taste-fibres, is however contradicted by almost all clinical experience. In cases of facial paralysis there is usually no loss of taste observed unless the lesion is at or distal to the geniculate ganglion.

With regard to the very positive evidence that in some

cases of trigeminal paralysis there is loss of taste, this may be said. In all the cases of which I have been able to read the account the lesion was a peripheral one, involving the roots of the fifth and generally that of other neighbouring nerves (*e. g.*, cases of Gowers, Erb, Romberg, Zambaco, *Méd.-chir. Rev.*, 1863, vol. i., p. 42), Ramskill (*Lancet*, Mar. 28, 1868, p. 406), Beveridge (*Med. Times and Gaz.*, 1868, vol. i., p. 199). Now the glosso-pharyngeal root is not far from that of the trigeminus; and the Vidian nerve, through which communication might be established with the glosso-pharyngeal, runs from Meckel's ganglion up through the foramen lacerum, passes directly under the Gasserian ganglion, and might easily be affected in diseases of that ganglion.

I think I may assert with some confidence that, as a point for local diagnosis, when there is a trigeminal paralysis with loss of taste, the lesion is probably peripheral; when taste is not involved, the lesion is probably central.

It appears to me, therefore, that we are justified in saying:

1st. That the glosso-pharyngeal sends taste-fibres directly to the posterior third of the tongue.

2d. That by the communications suggested by Dr. Carl it may send taste-fibres to the anterior two thirds of the tongue, *i. e.*, either through the chorda tympani or by various channels directly to the second branch of the inferior maxillary nerve.

The glosso-pharyngeal may communicate with the fifth, through the tympanic nerve and plexus, and thence via the small petrosal nerve to the otic ganglion, or via the large petrosal nerve and Meckel's ganglion.

3d. Paralysis of the trigeminus with loss of taste is due probably to a peripheral lesion, and other cranial nerves are generally involved; paralysis of it without loss of taste, to a central lesion.

I. The view that the *glosso-pharyngeal* is II. The view that the *glosso-pharyngeal* supplies part of the tongue with taste is supported by the sole nerve of taste is supported in addition by:

Panizza, 1834, by experiments.
Stannius, 1848, " "
Hall and Broughton, 1836-39, by experiment.
J. Reid (?), 1838, by experiment.
Valentin, 1834-64, " "
Bidder, 1846.
Duchenne, 1855, by experiment and Biffi and Morganti, 1846, by experiment.
Lussana, 1864-70, by experiment and C. Bernard, 1843-58, by experiment and clinical observation.
Prevost, 1873, by experiments.
Carl, 1874, by clinical observation.
V. Urbantschitsch, 1876, by clin. obs.

Magenide, 1824, by experiment.
J. Müller, 1837, " "
Rapp, 1832.
Elsasser, 1834.
Wagner, 1845, by experiment.
Alcock, 1837, " "
Vintschgau, " "
Duchenne, 1855, by experiment and Biffi and Morganti, 1846, by experiment.
Stamm.
Berard.
Renzi.
Viccioli.
Nixon.
Longet, 1869.
By a long list of clinical cases of trigeminal paralysis, reported by Erb, Althaus, Moos, Neumann.
By Lehmann, a case of *glosso-pharyngeal* paralysis.
By Grasset's cases of bulbar paralysis.

Duchenne, 1859, by experiment and clinical observation.
Lussana, 1864-70, " "
Duval (?)
Carl, 1875, " "
Vulpian, 1885, " "
Indirectly supported by cases of trigeminal paralysis without loss of taste, reported by: Romberg.

Stamm.
Berard.
Renzi.
Viccioli.
Nixon.
Longet, 1869.
By a long list of clinical cases of trigeminal paralysis, reported by Erb, Althaus, Moos, Neumann.
By Lehmann, a case of *glosso-pharyngeal* paralysis.
By Grasset's cases of bulbar paralysis.

III. The view that the *chorda* carries some or all the taste-fibres to the anterior two-thirds of the tongue is not denied. The view that these fibres come from a nucleus of the *glossopharyngeal* through the nerve of *Wrisberg*, or some other channel, is supported by:

The experiments of Schiff.
Numerous cases of trigeminal paralysis, with loss of taste in anterior two thirds of tongue, reported by:
Romberg, Von Meyer, Rigler, Austin, Hirschberg, Kocher, Guttmann, Seeligmüller, Erb, Senator, Gowers.

Against it are: